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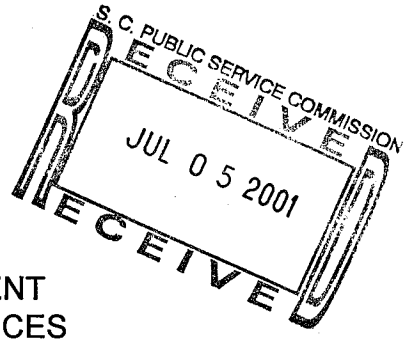


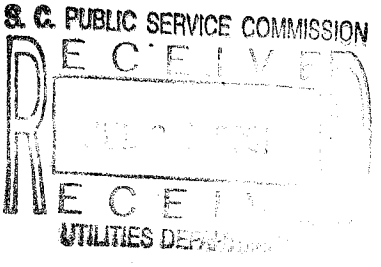
REBUTTAL TESTIMONY

OF

PAULINE M. AHERN, VICE PRESIDENT
AUS CONSULTANTS - UTILITY SERVICES

ON BEHALF OF

CAROLINA WATER SERVICE, INC.



CONCERNING

FAIR RATE OF RETURN

JULY 2001

RETURN DATE:
SERVICE:

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PURPOSE

Q. Please state your name, occupation and business address.

A. My name is Pauline M. Ahern and I am a Vice President of AUS Consultants - Utility Services. My business address is 155 Gaither Drive, P.O. Box 1050, Moorestown, New Jersey 08057.

Q. Are you the same Pauline M. Ahern who previously submitted direct testimony in this proceeding?

A. Yes, I am.

Q. What is the purpose of this testimony?

A. The purpose of this testimony is to rebut certain aspects of the direct testimonies of The Research Department of the Public Service Commission of South Carolina's Witness James E. Spearman and The Department of Consumer Affairs' Witness John B. Legler concerning various aspects of their recommended common equity cost rates for Carolina Water Service, Inc. (Carolina or the Company).

Q. Have you prepared an exhibit in support of this testimony?

A. Yes. It has been denoted as Rebuttal Exhibit No. __ (PMA-2) and consists of 7 schedules.

SUMMARY

Q. Please briefly summarize your rebuttal testimony.

A. My testimony will address the problems associated with both Dr. Spearman's and Dr. Legler's applications of the Risk Premium Model (RPM) and Capital Asset Pricing Model (CAPM). In addition, I explain why both Dr. Spearman's and Dr. Legler's recommended common equity cost rates are understated. Dr. Spearman's is understated because he has not adequately reflected Carolina's significantly greater relative business risk due to its small size vis-à-vis the four Value Line water companies upon whose market data he based his recommended common equity cost rate. Dr. Legler's recommendation is understated because: 1) it is based predominantly upon the Discounted Cash Flow (DCF) model; 2) it is based upon flawed applications of the RPM and CAPM; and 3) because it does not adequately reflect Carolina's greater relative business risk due to its small size vis-à-vis his proxy water companies.

COMMON EQUITY COST RATE

Dr. Spearman's Recommended Cost of Common Equity

Q. Please comment upon Dr. Spearman's application of the Capital Asset Pricing Model (CAPM).

A. Dr. Spearman's range of investor expected total market returns is from 13.0%, (apparently based upon the arithmetic mean return on large company common stocks for the years 1926-2000 from Ibbotson Associates' Stocks, Bonds, Bills and Inflation 2000 Yearbook) to 18.0%, (apparently based upon the arithmetic mean return of 17.8%, rounded to 18.0%, for the Standard & Poor's (S&P) 500 Index for the years 1990-2000). Regarding the 13.0% return, the correct arithmetic mean return on large company stocks for the period 1926-1999 is 13.3% as shown on page 2 of Schedule 1 of Rebuttal Exhibit No. ___(PMA-2). Hence, the lower end of his range of investor expected market returns should be 13.3%.

In addition, the 18.0% (17.8% on a rounded basis) total return for the S&P 500 Index is for the years 1990-2000, as discussed on page 10 of his direct testimony. On pages 41 and 42 of my direct testimony I explain why the use of long-term data is most appropriate for cost of capital purposes. As cited on pages 41 and 42, Ibbotson Associates[1] state:

> The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable.[4] Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series

[1] Ibbotson Associates, Stocks, Bonds, Bills and Inflation – 1999 Yearbook, pp. 27 and 156.

makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent time period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s and 1940s contain too many unusual events. This view is suspect because all periods contain "unusual" events. Some of the most unusual events this century took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, and the development of the European Economic Community – all of these happened in the last 20 years.

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929-1931 period.

Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 75-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time, and their return expectations reflect this. (footnotes omitted)

In addition to the foregoing, Ibbotson Associates' comments about choosing an appropriate historical period for purposes of estimating equity risk premium as discussed in its 2001 Yearbook can be found at Rebuttal Exhibit No. __ (PMA-2), Schedule 2, pages 2 and 3. Ibbotson Associates

make it clear that measuring the equity risk premium over very long periods of time provides greater stability to the premium. Thus, to avoid analyst bias and to ensure greater stability, use of long-term averages is appropriate for cost of capital purposes. Moreover, it should be kept in mind that the DCF model, upon which Dr. Spearman also places reliance, is predicated upon an infinite investment horizon, a concept embodied in and compatible with the use of a very long-term arithmetic average equity risk premium.

In view of the foregoing, it should be clear that the arbitrary use of shorter time periods is unlikely to be representative of the average equity risk premium experienced over a long period of time in the future and therefore is not consistent with the infinite investment horizon presumed for common stocks. Hence, the upper end of Dr. Spearman's range of investor expected market returns becomes 14.4%, the arithmetic mean annual return of the S&P 500 Index for the years 1970-1990 discussed at lines 8 and 9 on page 10 of his direct testimony.

Q. Have you recalculated Dr. Spearman's CAPM results using Dr. Spearman's CAPM inputs but correcting for the correct 1926-1990 total return on large company stocks of 13.3% and the 14.4% arithmetic mean annual return of the Standard & Poor's 500 Index for the years 1970-1990?

A. Yes. On Schedule 3 of Rebuttal Exhibit No. ___(PMA-2), I have shown that the average CAPM results range from 10.25% to 10.91%, with a midpoint of 10.58%.

Q. Please comment upon Mr. Spearman's application of the Risk Premium Model (RPM).

A. Dr. Spearman's application of the RPM is not a true, company / group specific RPM analysis. Rather, it is an historical CAPM analysis in that it relies upon an historical equity risk premium relative to a risk-free rate and not a company / group specific bond yield. This historical equity risk premium is then added to the March-May 2001 average long-term government bond yield. As discussed in my direct testimony, at pages 38 and 39, while there are some similarities between the CAPM and RPM, there is a very significant distinction between the two models. Both models add an equity risk premium to an interest rate. However, by using a Treasury security in the RPM model, Dr. Spearman is capturing only systematic risk, because the use of a risk-free rate of return in the CAPM does not, and by definition can not, reflect a company's specific, i.e., unsystematic risk. However, by using a long-term company / group specific bond yield, one can fully capture unsystematic risk in a RPM analysis. This can be verified by referring to pages 3 through 10 of Schedule 2 of Exhibit No. ___(PMA-1), which confirm that the bond rating process involves an

assessment of all business and financial risk, i.e., total risk. Therefore, Dr. Spearman's application of the RPM, because it relies upon a risk-free rate, is really a CAPM analysis, although he does acknowledge that the theory behind the RPM is that "common stockholders require a premium above the cost of debt to compensate them for the added risk of being subordinate to debt holders on claims on a companies [sic] earnings or assets." (see page 11, line 21 through page 12, line 1 of his direct testimony.) However, Dr. Spearman has ignored the reality that the cost of debt to any firm or group of firms is greater than the yield on long-term government bonds, i.e., a risk-free rate.

Q. Have you recalculated Dr. Spearman's RPM results using Dr. Spearman's RPM inputs but correcting the bond yield to reflect the yield on public utility bonds?

A. Yes. On Schedule 4 of Rebuttal Exhibit No. ___(PMA-2) I have first deducted the long-term average corporate bond yield (Line No. 2) from the total return on large company common stocks and from the average return on the S&P 500 Index (Line No. 1). I have also deducted the long-term average public utility bond yield (Line No. 2) from the total return on the S&P Utility Index (Line No. 1). The resultant equity risk premiums are shown in Line No. 3. Next, I adjusted the equity risk premiums, if necessary, by the average beta of the four Value Line water companies, as did Dr. Spearman, resulting in the

utility equity risk premiums shown in Line No. 5. Then, I added these utility equity risk premiums to the March-May 2001 average yield on public utility bonds rated A1 by Moody's, the average Moody's bond rating of the four Value Line water companies as shown on page 2 of Schedule 12 of Rebuttal Exhibit No. ___(PMA-2). Line No. 7 shows that the RPM results range from 10.52% to 12.42%, with a midpoint of 11.47%.

Dr. Legler's Recommended Cost of Common Equity

Q. Please comment upon Dr. Legler's application of the RPM.

A. Dr. Legler describes the application of the RPM on pages 21 – 27 of his direct testimony. He did not derive specific equity risk premiums for the four Value Line water companies he utilized in his DCF analysis. Rather, he derived generic equity risk premiums based upon DCF and CAPM analyses for the years 1989-1999 for a group of six water companies: American Water Works Co., Inc.; Aquarion Company; California Water Service Group; Consumers Water Company; Philadelphia Suburban Corp.; and United Water Resources, Inc. As Dr. Legler notes on page 25 of his direct testimony, three of these companies have been acquired, namely, Aquarion Co., Consumers Water Co., and United Water Resources, Inc. The common stock of these three companies is no longer publicly traded. Hence, a common equity cost rate based upon the historical market data of

companies whose common stock is no longer publicly traded, is inconsistent with a DCF-based common equity cost rate for the four Value Line water companies whose common stock is actively traded.

Nevertheless, Dr. Legler applied the DCF model utilizing three different measures of growth, namely; retention growth, projected DPS growth and projected EPS growth as shown on pages 1 through 3 of Schedule 6 of Exhibit __ (JBL-1) to derive equity risk premiums. In addition, he utilized a CAPM analysis to derive his generic equity risk premiums. Dr. Legler's risk premium analyses are heavily dependent upon the DCF because three out of four of his equity risk premiums are derived from DCF cost rates, an exercise in circularity. Moreover, his DCF-based risk premiums are understated because the DCF model understates investors' required returns for price-regulated public utilities when market-to-book ratios are significantly greater than one, as is the case in the current environment, a point discussed at length in my direct testimony. In addition, Dr. Legler's risk premium analysis suffers from additional circularity because his fourth equity risk premium is derived from the application of CAPM models. In view of the foregoing, it is apparent that Dr. Legler has performed no independent analysis of equity risk premiums.

It is also quite evident that Dr. Legler's average equity risk premiums are understated when compared with equity risk premiums derived using long-term holding period returns such as those I used in both my RPM and CAPM analyses. Dr. Legler's equity risk premiums based upon Moody's A-

rated public utility bond yields averaged 2.50% for the period 1989-1999. In contrast, the beta-adjusted equity risk premium utilized in my RPM analysis was 5.1% for both proxy groups of water companies as shown on Exhibit No. ___ (PMA-1), page 6 of Schedule 12 and the equity risk premiums based upon A rated public utility bonds was 5.2%, as shown on Exhibit No. ___(PMA-1), page 8 of Schedule 12. Clearly, an equity risk premium of 2.50% based upon Moody's A-rated public utility bond yields understates the true investor expected equity risk premium for water companies.

Also, Dr. Legler's equity risk premium based upon 30-year Treasury bond yields averaged 3.55% for the ten-year period 1989-1999. In contrast, the equity risk premium based upon the traditional CAPM was 5.8% for both proxy groups of water companies as shown on Exhibit No. ___(PMA-1), page 2 of Schedule 13. The equity risk premium based upon the empirical CAPM was 6.8% as shown on Exhibit No. ___(PMA-1), page 3 of Schedule 13. Hence, an equity risk premium of 3.55% based upon 30-year Treasury bond yields clearly understates the true investor-expected equity risk premium for water companies.

In addition, Dr. Legler's equity risk premiums are calculated over the period 1989-1999. As discussed previously in this rebuttal testimony and at pages 41 and 42 of my direct testimony, the use of long-term data is most appropriate for cost of capital purposes. The previously cited Ibbotson Associates excerpt makes it clear that measuring the equity risk

premium over very long periods of time provides greater stability to the premium. Thus, to ensure greater stability and avoid analyst bias, use of the long-term averages is appropriate for cost of capital purposes. Moreover, it should be kept in mind that the standard DCF model, upon which Dr. Legler places principal reliance, is predicated upon an infinite investment horizon, a concept embodied in and compatible with the use of a very long-term arithmetic average equity risk premium.

In view of the foregoing, it should be clear that use of arbitrarily shorter time periods is neither representative of the average equity risk premium experienced over a long period of time in the future nor consistent with the infinite investment horizon presumed for common stocks.

Had Dr. Legler utilized the more appropriate equity risk premiums relative to A rated water companies of 5.1% based upon the beta approach and 5.2% based upon the holding period returns of pubic utilities whose bonds are rated A, his risk premium results relative to Moody's single-A rated public utility bond yield of 8.2% would have ranged between 12.9 % and 13.5%.

7.8% + 5.1% = 12.9%

7.8% + 5.2% = 13.0%

Likewise, had Dr. Legler utilized the more appropriate equity risk premiums relative to 30-year Treasury bonds of 5.8% based upon the traditional CAPM and 6.8% based upon the empirical CAPM for water

companies, his risk premium results relative to a 30-year Treasury bond yield of 5.7% would have ranged between 11.5 % and 12.5%.

5.7% + 5.8% = 11.5%

5.7% + 6.8% = 12.5%

Q. On page 29 of his direct testimony, at lines 19 through page 30, line 12, Dr. Legler criticizes the use of adjusted betas. Please comment.

A. On lines 20 and 21 of page 29, Dr. Legler states that "the theoretical linkage between the adjusted beta and the CAPM model is tenuous, at best." However, he does not provide any empirical support for this statement other than the fact that he knows of "no recent empirical tests which indicate that the beta of all stocks converge towards 1.0 or even that utility stocks converge the same way as other stocks." Such a statement does not support his position that the "linkage between the adjusted beta and the CAPM model is tenuous." As Carl Sagan has said, "Absence of evidence is not evidence of absence." In fact, there is ample evidence of the tendency of betas to converge towards one in the financial literature. Schedule 5 of Rebuttal Exhibit No. __ (PMA-2) is an excerpt from Roger A. Morin's book Regulatory Finance: Utilities' Cost of Capital, published in 1994. In this excerpt, Morin[2] states:

> The regression tendency of betas to converge to 1.0 over time is very well known and widely discussed in the financial

[2] Regulatory Finance: Utilities' Cost of Capital, Roger A. Morin, Public Utility Reports, 1994, pp. 67-68.

literature. Because of this regressive tendency, a company's raw unadjusted beta is not the appropriate measure of market risk to use.

As discussed previously, and as shown on Schedule 10, Exhibit No. __ (PMA-1), about 82%/74% of the common shares of my two proxy groups of water companies are owned by individuals. Individuals are quite likely to rely upon information published by Value Line Investment Survey (Standard Edition) because it is relatively inexpensive and is easily accessible in the business reference section of most libraries – and Value Line publishes betas which are adjusted for regression bias. Investors rely upon those adjusted betas.

In view of the foregoing, Dr. Legler's criticism of the use of adjusted betas is completely without merit.

Q. On page 30, lines 5 through 12, Dr. Legler comments on the estimation of betas relative to a risk free rate. Please comment.

A. These comments are meaningless because neither the Value Line adjusted betas nor the S&P unadjusted betas utilized by Dr. Legler are estimated based upon risk premiums derived from risk-free rates. Page 1 of Rebuttal Exhibit No. ___(PMA-2), Schedule 6 is a copy of Value Line's description of its beta calculation and subsequent adjustment. As indicated on page 1 of Schedule 6, Value Line calculates its betas from least-squares regression analyses "between weekly percent changes in the price of a stock and weekly

percent changes in the New York Stock Exchange Composite Index over a period of five years." Value Line does not calculate its betas from excess returns relative to a risk-free rate. Likewise, as shown on page 2 of Schedule 6, S&P calculates its betas using month-end closing prices (including dividends), without mentioning any relation to a risk-free rate.

Q. Do you have any other comments regarding Dr. Legler's CAPM analyses?

A. Yes. Despite his comments on page 14, lines 19-20 of his direct testimony that ". . . for most utilities in general, it is the future, not the past, that is relevant," Dr. Legler has based his CAPM analysis exclusively upon historical risk premiums. Also, the group of water companies upon which he based his CAPM analysis is inconsistent with the group of water companies upon which his DCF and RPM analyses are based. Hence, the common equity cost rate derived from his CAPM analysis is not consistent with his DCF and RPM-derived common equity cost rates. On Schedule 7 of Rebuttal Exhibit No. ___(PMA-2), I have recalculated the traditional and empirical CAPM results using both a historical and projected equity risk premium for the four Value Line water companies upon which Dr. Legler based his DCF analysis. The average result is summarized below:

Value Line Water Cos.	12.0%

Clearly then, Dr. Legler's CAPM results are understated because they are based, in part, upon his erroneous use of unadjusted betas and his erroneous exclusive reliance upon historical risk premiums.

Q. Do you have any comments regarding Dr. Legler's comparable earnings analysis?

A. Yes. Dr. Legler discusses comparable earnings at pages 32 through 35 of his direct testimony. He agrees that the comparable earnings approach is based upon the opportunity cost principle and the Hope Supreme Court case. He also notes that "[t]he major problem in applying the comparable earnings approach is the difficulty in determining what companies are comparable to the utility in question," and therefore, rejects the comparable earnings approach using industrial, i.e., non-price regulated, companies but does not develop a selection criteria for non-utility companies based upon total risk. In contrast, in my direct testimony, at pages 54 through 56, I show that it is indeed possible to develop a group of non-price regulated companies comparable in total risk due to selection criteria which reflect total risk, i.e., the sum of market or systematic (non-diversifiable) risk and company-specific unsystematic (diversifiable) risks. It is done through the use of betas which reflect similar systemic risk and the standard errors of the regressions which gave rise to those betas which reflect similar diversifiable, unsystematic, risk.

Dr. Legler disregards the possibility of developing selection criteria based upon similar risk. Instead, he claims that his "DCF analysis for the groups of water companies has the attributes of a forward looking comparable earnings analysis since it is a market based approach." (see lines 10 through 12, page 34 of his direct testimony) Once again, Dr. Legler has engaged in circular reasoning which he implicitly admits at page 34, lines 20 through 22 when he states "If all commissions set allowed returns on the basis of what other companies were expected to earn or have earned, circularity of reasoning would be a problem." This is precisely what commissions do when setting allowed rates of return on equity based upon any or all market-based cost of common equity models; the DCF, RPM, and CAPM. Each model estimates investors' expected return on their investments measured at market value, which then becomes the basis for the allowed return on the common equity financed portion of an original cost rate base (i.e., book value). In other words, the allowed return on book common equity is based upon the return which investors expect to earn on the market value of their investment in the common stock of other utilities. Therefore, Dr. Legler's comparable earnings approach is circular. My comparable earnings approach avoids circularity.

Q. You have shown that the common equity cost rates for the Value Line water companies used by Dr. Spearman and Dr. Legler understate the common

equity cost rate applicable to Carolina. What would properly calculated common equity cost rates be?

A. They would be as follows:

	Dr. Spearman	Dr. Legler	
		Spot Prices	Avg. Prices
DCF – Value Line Water Cos.	10.15%-10.80%(1)		
Retention Growth		9.94%(2)	10.00%(2)
Value Line Dividend Growth		6.67 (2)	6.74 (2)
Value Line Earnings Growth		10.69 (2)	10.76 (2)
Properly Calculated RP Cost Rates Discussed Above			
Relative to Public Utility Bonds	10.52% - 12.42%(3)	12.9% - 13.0% (4)	
Relative to 30-Year Treasury Bonds		11.5% - 12.5% (4)	
Properly Calculated CAPM Cost Rates Discussed Above			
Value Line Water Cos.	10.25% - 10.91%(5)		12.0%(6)

	2000	2001	2002
Comparable Earnings (Dr. Legler)	10.13%(2)	10.50%(2)	11.25%(2)
Range of Properly Calculated Common Equity Cost Rates	10.50% - 11.50% *	10.00% - 11.00% *	

(1) From page 13 of Dr. Spearman's direct testimony.
(2) From page 36 of Dr. Legler's direct testimony.
(3) From Rebuttal Exhibit No. __ (PMA-2), Schedule 3.
(4) From page 11 of this testimony.
(5) From Rebuttal Exhibit No. __ (PMA-2), Schedule 4.

* without regard to the greater relative risk of Carolina due to its small size vis-à-vis the proxy water companies.

Q. What conclusions do you draw from Dr. Spearman's DCF results coupled with properly calculated RPM and CAPM results?

A. Based on the table above, I conclude that the same range of common equity cost rates, 10.50% - 11.50%, as recommended by Dr. Spearman is

indicated. The midpoints of his results are: 10.48% based upon the DCF results, 11.47% based upon a properly calculated RPM, and 10.58% based upon a properly calculated CAPM. However, contrary to Dr. Spearman's opinion, this range does not adequately reflect the greater relative business risk of Carolina, based upon its extremely small size vis-à-vis the four Value Line water companies upon whose market data Dr. Spearman based his recommendation.

Q. Please explain.

A. Dr. Spearman compares the risk of Carolina with that of its parent, Utilities, Inc. and concludes that Carolina has similar risk to Utilities, Inc., while also noting that size is a factor of risk as discussed on pages 14 and 15 of his direct testimony. Dr. Spearman then compares the risk of Utilities, Inc. with that of "other regulated water and wastewater companies" noting that "Utilities, Inc. should have a risk similar to that of other regulated water and wastewater companies regardless of size." These are not appropriate comparisons. Notwithstanding the fact that Dr. Spearman begins his testimony by stating that its purpose is "to determine the cost of equity or return-on-equity appropriate for Utilities, Inc., the parent company of Carolina Water Service, Inc." . . . and to "determine the overall cost of capital for Utilities, Inc.", rates set in this proceeding will and must be applied to the jurisdictional rate base of Carolina and not that of Utilities,

Inc. In making these statements Dr. Spearman has ignored the basic principle of rate base / rate of return, namely, that the cost of equity which is deemed appropriate by the Commission in this proceeding will be applied exclusively to the jurisdictional rate base of Carolina. Therefore, Dr. Spearman's recommendation is understated because he ignores a basic financial precept, i. e., the risk rate (return rate) is related to the asset in which capital is invested. Under the rate base / rate of return paradigm, it is the rate base of the regulated entity to which a rate of return set in a regulatory proceeding will be applied. In short, it is Carolina's rate base, and the risk of investing therein which is "the asset" for which the rate of return (and risk) must be compatible. This means that the rates set in the instant docket will be applied to Carolina's rate base and Carolina's rate base alone – and not the collective rate bases of all of the subsidiaries of its parent, Utilities, Inc. Therefore, it is the risk to which investment in Carolina's rate base is exposed, and no other, which is relevant.

As demonstrated in my direct testimony at page 10, line 34 through page 13, line 18, Carolina is significantly smaller than the average Value Line water company. As shown in Table 3 on page 12 of my direct testimony, the average Value Line water company is 143.6 times the size of Carolina based upon total capital for the year 2000 and 52.1 times the size of Carolina based upon estimated market capitalization at year-end 2000. Dr. Spearman's Exhibit (JES-1) provides further evidence that the Value Line water companies are significantly larger than Carolina. Exhibit

(JES-1) shows that the average Value Line water company is 104.8 times the size of Carolina in terms of operating revenues, 67.6 times the size in terms of net utility plant and 71.4 times the size in terms of number of customers.

Even though Dr. Spearman has concluded that a common equity cost rate in the range of 10.50% - 11.50% appropriately reflects the risk of Utilities, Inc. and hence, by reference, Carolina, such a range is applicable to the four Value Line water companies whose risk is significantly less than Carolina's based upon both size and geographical diversification. Page 57, line 4 through page 59, line 8 of my direct testimony and Exhibit No. ___(PMA-1), Schedule 1, page 4, indicate that an appropriate risk premium to reflect the small size of Carolina relative to the four Value Line water companies is in the range of 3.60% - 3.70%, with a midpoint of 3.65%. This means that, based upon Dr. Spearman's range of common equity cost rates applicable to the four Value Line water companies, the appropriate range of common equity cost rates applicable to Carolina could be as high as 14.15% - 15.15%. However, if my conservatively reasonable investment risk adjustment of 50 basis points, i.e., 0.50%, is added to Dr. Spearman's range of common equity cost rate, his conclusion would become a range of common equity cost rate of 11.00% - 12.00%, with a midpoint of 11.50%.

Q. Has Dr. Legler adequately reflected the increased risk of Carolina due to its small size in his recommendation?

A. No. Although Dr. Legler acknowledges, that size can affect the business risk of a utility on page 19, lines 19 and 20 of his direct testimony, he has concluded that he has "no reason to believe that the group, on average, does not approximate the riskiness of Carolina Water." Erroneously, therefore, Dr. Legler made no adjustment to the results of his cost of equity analysis for the water utilities to reflect Carolina's increased risk due to its very small size. For this reason, based upon the table above, I conclude that Dr. Legler's recommended common equity cost rate range of 10.0% - 11.0% is grossly underestimated. Properly calculated RPM and CAPM analyses indicate that the upper end of the range should be 12.5%. The midpoint of a range of common equity cost rate of 10.0% - 12.5% is 11.25%. As discussed above, relative to Dr. Spearman's analyses, Dr. Legler's properly calculated range of common equity cost rate is applicable to water companies which are much larger than Carolina. Based upon the discussion on page 57, line 4 through page 59, line 8 of my direct testimony and Exhibit No. ___(PMA-1), Schedule 1, page 4, an appropriate risk premium to reflect the small size of Carolina relative to the four Value Line water companies is in the range of 3.60% - 3.70%, or a midpoint of 3.65%. Adding a 3.65% equity risk premium to the 11.25% midpoint of the properly calculated range of common equity cost rates indicates that a common equity cost rate as high as 14.9% based upon Dr. Legler's analyses, properly calculated, is applicable to Carolina. However, if my conservatively reasonable investment risk adjustment of 50

basis points, i.e., 0.50%, is added to Dr. Legler's range of common equity cost rate, his conclusion would become a range of common equity cost rate of 10.50% - 13.00%, with a midpoint of 11.75%.

Q. Does that conclude your rebuttal testimony?

A. Yes.

BEFORE THE

PUBLIC SERVICE COMMISSION OF SOUTH CAROLINA
DOCKET NO. 2000-0207 W/S

EXHIBIT

TO ACCOMPANY THE

REBUTTAL TESTIMONY

OF

PAULINE M. AHERN, VICE PRESIDENT
AUS CONSULTANTS - UTILITY SERVICES

ON BEHALF OF

CAROLINA WATER SERVICE, INC.

CONCERNING

FAIR RATE OF RETURN

JULY 2001

STOCKS
BONDS
BILLS
AND
INFLATION

SBBI

2000
YEARBOOK

MARKET
RESULTS
FOR
1926-1999

IBBOTSON
ASSOCIATES

Table 6-7 **Total Returns, Income Returns, and Capital Appreciation of the Basic Asset Classes** Summary Statistics of Annual Returns

From 1926 to 1999

Series	Geometric Mean	Arithmetic Mean	Standard Deviation	Serial Correlation
Large Company Stocks				
Total Returns	11.3%	13.3%	20.1%	0.01
Income	4.5	4.5	1.4	0.85
Capital Appreciation	6.6	8.5	19.5	0.02
Small Company Stocks				
Total Returns	12.6	17.6	33.6	0.08
Long-Term Corporate Bonds				
Total Returns	5.6	5.9	8.7	0.09
Long-Term Government Bonds				
Total Returns	5.1	5.5	9.3	–0.03
Income	5.2	5.2	2.8	0.97
Capital Appreciation	–0.3	0.1	8.1	–0.18
Intermediate-Term Government Bonds				
Total Returns	5.2	5.4	5.8	0.17
Income	4.8	4.8	3.0	0.96
Capital Appreciation	0.3	0.4	4.4	–0.21
Treasury Bills				
Total Returns	3.8	3.8	3.2	0.92
Inflation	3.1	3.2	4.5	0.65

Total return is equal to the sum of three component returns; income return, capital appreciation return, and reinvestment return. Annual reinvestment returns for select asset classes are provided in Table 2-6.

Stocks, Bonds, Bills, and Inflation

SBBI

Valuation Edition
2001 Yearbook

IbbotsonAssociates

Finnerty and Leistikow perform more econometrically sophisticated tests of mean reversion in the equity risk premium. Their tests demonstrate that—as we suspected from our simpler tests—the equity risk premium that was realized over 1926 to the present was almost perfectly free of mean reversion and had no statistically identifiable time trends.[3] Lo and MacKinlay conclude, "the rejection of the random walk for weekly returns does not support a mean-reverting model of asset prices."

Choosing an Appropriate Historical Period

The estimate of the equity risk premium depends on the length of the data series studied. A proper estimate of the equity risk premium requires a data series long enough to give a reliable average without being unduly influenced by very good and very poor short-term returns. When calculated using a long data series, the historical equity risk premium is relatively stable.[4] Furthermore, because an average of the realized equity risk premium is quite volatile when calculated using a short history, using a long series makes it less likely that the analyst can justify any number he or she wants. The magnitude of how shorter periods can affect the result will be explored later in this chapter.

Some analysts estimate the expected equity risk premium using a shorter, more recent time period on the basis that recent events are more likely to be repeated in the near future; furthermore, they believe that the 1920s, 1930s, and 1940s contain too many unusual events. This view is suspect because all periods contain "unusual" events. Some of the most unusual events of this century took place quite recently, including the inflation of the late 1970s and early 1980s, the October 1987 stock market crash, the collapse of the high-yield bond market, the major contraction and consolidation of the thrift industry, the collapse of the Soviet Union, and the development of the European Economic Community—all of these happened in the last 20 years.

It is even difficult for economists to predict the economic environment of the future. For example, if one were analyzing the stock market in 1987 before the crash, it would be statistically improbable to predict the impending short-term volatility without considering the stock market crash and market volatility of the 1929–1931 period.

Without an appreciation of the 1920s and 1930s, no one would believe that such events could happen. The 75-year period starting with 1926 is representative of what can happen: it includes high and low returns, volatile and quiet markets, war and peace, inflation and deflation, and prosperity and depression. Restricting attention to a shorter historical period underestimates the amount of change that could occur in a long future period. Finally, because historical event-types (not specific

3 Though the study performed by Finnerty and Leistikow demonstrates that the traditional equity risk premium exhibits no mean reversion or drift, they conclude that, "the processes generating these risk premiums are generally mean-reverting." This conclusion is completely unrelated to their statistical findings and has received some criticism. In addition to examining the traditional equity risk premia, Finnerty and Leistikow include analyses on "real" risk premia as well as separate risk premia for income and capital gains. In their comments on the study, Ibbotson and Lummer show that these "real" risk premia adjust for inflation twice, "creating variables with no economic content." In addition, separating income and capital gains does not shed light on the behavior of the risk premia as a whole.

4 This assertion is further corroborated by data presented in *Global Investing: The Professional's Guide to the World of Capital Markets* (by Roger G. Ibbotson and Gary P. Brinson and published by McGraw-Hill, New York). Ibbotson and Brinson constructed a stock market total return series back to 1790. Even with some uncertainty about the accuracy of the data before the mid-nineteenth century, the results are remarkable. The real (adjusted for inflation) returns that investors received during the three 50-year periods and one 51-year period between 1790 and 1990 did not differ greatly from one another (that is, in a statistically significant amount). Nor did the real returns differ greatly from the overall 201-year average. This finding implies that because real stock-market returns have been reasonably consistent over time, investors can use these past returns as reasonable bases for forming their expectations of future returns.

events) tend to repeat themselves, long-run capital market return studies can reveal a great deal about the future. Investors probably expect "unusual" events to occur from time to time, and their return expectations reflect this.

A Look at the Historical Results

It is interesting to take a look at the realized returns and realized equity risk premium in the context of the above discussion. Table 4-5 shows the average stock market return and the average (arithmetic mean) realized long-horizon equity risk premium over various historical time periods. Similarly, Graph 4-5 shows the average (arithmetic mean) realized equity risk premium calculated through 2000 for different starting dates. The table and the graph both show that using a longer historical period provides a more stable estimate of the equity risk premium. The reason is that any unique period will not be weighted heavily in an average covering a longer historical period. It better represents the probability of these unique events occurring over a long period of time.

Table 4-5

Stock Market Return and Equity Risk Premium Over Time
1926–2000

Period Length	Period Dates	Large Company Stock Arithmetic Mean Total Return	Long-Horizon Equity Risk Premium
75 years	1926–2000	13.0%	7.8%
70 years	1931–2000	13.1%	7.7%
60 years	1941–2000	14.1%	8.3%
50 years	1951–2000	14.5%	8.7%
40 years	1961–2000	13.1%	5.8%
30 years	1971–2000	14.5%	6.3%
20 years	1981–2000	16.5%	8.1%
15 years	1986–2000	16.8%	9.5%
10 years	1991–2000	18.4%	11.6%
5 years	1996–2000	19.4%	13.2%

Looking carefully at Graph 4-5 will clarify this point. The graph shows the realized equity risk premium for a series of time periods through 2000, starting with 1926. In other words, the first value on the graph represents the average realized equity risk premium over the period 1926–2000. The next value on the graph represents the average realized equity risk premium over the period 1927–2000, and so on, with the last value representing the average over the most recent five years, 1996–2000. Concentrating on the left side of Graph 4-5, one notices that the realized equity risk premium, when measured over long periods of time, is relatively stable. In viewing the graph from left to right, moving from longer to shorter historical periods, one sees that the value of the realized equity risk premium begins to decline significantly. Why does this occur? The reason is that the severe bear market of 1973–1974 is receiving proportionately more weight in the shorter, more recent average. If you continue to follow the line to the right, however, you will also notice that when 1973 and 1974 fall out of the recent average, the realized equity risk premium jumps up by nearly three percent.

Exhibit No. ___(PMA-2)
Schedule 3

Carolina Water Service, Inc.
Research Department's Witness Spearman's
Water and Wastewater Industry
Capital Asset Pricing Model Return-on-Equity Corrected
to Properly Reflect Appropriate 1926-1999 Ibbotson Market Rate
of Return and Eliminate 1990-2000 Market Rate of Return

Company	Value Line Beta (B) (1)	Market Rate of Return (Rm) (2)	Risk-Free Rate of Return (Rf) (1)	Expected Return on Equity (%)
American States Water Co.	0.65	13.3	5.67	10.63
American Water Works Co.	0.55	13.3	5.67	9.87
California Water Service Group	0.65	13.3	5.67	10.63
Philadelphia Suburban Corp.	0.60	13.3	5.67	10.25
Average	0.60	13.3	5.67	10.25

Company	Value Line Beta (B) (1)	Market Rate of Return (Rm) (3)	Risk-Free Rate of Return (Rf) (1)	Expected Return on Equity (%)
American States Water Co.	0.65	14.4	5.67	11.34
American Water Works Co.	0.55	14.4	5.67	10.47
California Water Service Group	0.65	14.4	5.67	11.34
Philadelphia Suburban Corp.	0.60	14.4	5.67	10.91
Average	0.60	14.4	5.67	10.91

Notes: (1) From Exhibit (JES-8).
(2) Ibbotson Associates, Inc., Stocks, Bonds, Bills and Inflation - 2000 Yearbook - Market Results for 1926 - 1999, Chicago, IL, p. 124. (See page 2 of Schedule 1 of this Exhibit.
(3) From page 10, line 8 of Mr. Spearman's direct testimony.

Carolina Water Service, Inc.
Research Department Witness Spearman's Risk Premium Cost of Equity Capital Corrected to Properly Reflect an Equity Risk Premium Based upon Corporate Bonds, Adjusted to Reflect Yields on A1 Rated Public Utility Bonds

Line No.	Ibbotson Associates (1926 - 1999)			Research Department (1970 - 2000)			Research Department (1970 - 2000)		
1.	Total return on large company stocks	13.30	% (1)	Average return on S&P 500 Index	14.35	% (2)	Average return on S&P 500 Index	14.49	% (2)
2.	Long-term corporate bond yield	5.90	% (1)	Long-term corporate bond yield	9.84	% (5)	Long-term A-rated public utility bond yield	9.84	% (4)
3.	Equity risk premium	7.40	%	Equity risk premium	4.51	%	Equity risk premium	4.65	%
4.	Utility adjustment (beta)	0.61	(2)	Utility adjustment (beta)	0.61	(2)	Utility adjustment (beta)	NA	
5.	Utility equity premium	4.51	%	Utility equity premium	2.75	%	Utility equity premium	4.65	
6.	March-May 2001 yield on A1 rated public utility bonds	7.77	%		7.77	%		7.77	%
7.	Risk Premium Derived Common Equity Cost Rate	12.28	%		10.52	%		12.42	%

Note: (1) Ibbotson Associates, Inc., Stocks, Bonds, Bills and Inflation - 2000 Yearbook - Market Results for 1926 - 1999, Chicago, IL, p. 124. (See page 2 of Schedule 1 of this Exhibit.
(2) From Exhibit (JES-9).
(3) Derived from information shown in Ibbotson Associates, Inc., Stocks, Bonds, Bills and Inflation - Valuation Edition 2001 Yearbook - Market Results for 1926 - 2000, Chicago, Il, 2001, pp. 206-207.
(4) Moody's Investor's services.
(5) March-May 2001 yield on A-rated public utility bonds of 7.87%, adjusted by 1 / 3 the average spread of 20 basis points between A-rated and Baa-rated public utility bonds for march-May 2001. Derived from information shown in Exhibit No. (PMA-1), Schedule 12, page 4.

Exhibit No. ___(PMA-2)
Schedule 4

REGULATORY FINANCE:

UTILITIES' COST OF CAPITAL

Roger A. Morin, PhD

in collaboration with
Lisa Todd Hillman

1994
PUBLIC UTILITIES REPORTS, INC.
Arlington, Virginia

Value Line betas, which is calculated using weekly returns, may not differ substantially from the ranking obtained using the Merrill Lynch beta, which is calculated using monthly returns.

In addition to time period, duration and market index, measurement error is also a concern. Individual company betas are measured with error. To lessen the significance of measurement errors in estimating betas, proxy groups of companies and/or industry estimates can be used. The empirical finance literature shows that the standard error of estimate of betas is considerably smaller for portfolios than for individual company observations. Betas for groups of securities are more stable and more accurate than betas for individual securities.

Raw Beta Versus Adjusted Beta. The regression tendency of betas to converge to 1.0 over time is very well known and widely discussed in the financial literature. Because of this regressive tendency, a company's raw unadjusted beta is not the appropriate measure of market risk to use. Current stock prices reflect expected risk, that is, expected beta, rather than historical risk or historical beta. Historical betas, whether raw or adjusted, are only surrogates for expected beta. The best of the two surrogates is adjusted beta.

Numerous studies have considered the question of beta measurement and generally reached similar conclusions. Betas have tended to regress toward the mean; high-beta portfolios have tended to decline over time toward unity, while low-beta portfolios have tended to increase over time toward unity. True betas not only vary over time but have a tendency to move back toward average levels. A company whose operations or financing make the risk of its stock divergent from other companies is more likely to move back toward the average than away from it.

Such changes in beta values are due to real economic phenomena, not simply to an artifact of overly simple statistical procedures.

From a Bayesian framework, and without any information at all on true beta, one would presume a stock's beta in relation to the market to be 1.00. Given a chance to see how the stock moved in relation to the market over some historical period, a modification of this "prior" estimate would seem appropriate. But a sensible "posterior" estimate would likely lie between the two values.

Statistically, betas are estimated with error.[4] Therefore, high-estimated betas will tend to have positive error (overestimated) and low-estimated

[4] This section draws from Perry (1991).

betas will tend to have negative error (underestimated). Therefore, it is necessary to squash the estimated betas in toward 1.00. One way to do this is by measuring the extent to which estimated betas tend to regress toward the mean over time. As a result of this beta drift, several commercial beta producers adjust their forecasted betas toward 1.00 in effort to improve their forecasts. This adjustment, which is commonly performed by investment services such as Value Line and Merrill Lynch, uses the formula:

$$\text{adjusted } \beta = 1.00 + K \text{ (raw } \beta - 1.00)$$

where K is an estimate from past data of the extent to which estimated betas regress toward the mean. Merrill Lynch obtains its adjusted beta values by giving approximately 66% weight K to the measured beta and approximately 34% weight to the prior value of 1.0 for each stock. These adjustments are modified slightly from time to time. Value Line betas are also periodically adjusted for their long-term tendency to regress toward 1.00 using a similar procedure. Another advantage of the beta adjustment technique, besides adjusting for regression bias, is that it also adjusts for any underlying tendency of the true betas to move toward 1.00.[5]

Several authors have investigated the regression tendency of beta. For example, Blume (1971) examined the stability of beta for all common stocks listed on the NYSE, and found a tendency for a regression of the betas toward 1.00. He demonstrated that the Value Line adjustment procedure anticipates differences between past and future betas. Chen (1981) also analyzed the variability of beta and suggested the Bayesian adjustment approach used by beta producers to estimate time-varying betas. A comprehensive study of beta measurement methodology by Kryzanowski and Jalilvand (1983) concludes that raw unadjusted beta (OLS beta) is one of the poorest beta predictors, and is outperformed by the Merrill Lynch-style Bayesian beta approach. Gombola and Kahl (1990) examined the time-series properties of utility betas and found strong support for the application of adjustment procedures such as the Value Line and Merrill Lynch procedures. Well-known college-level finance textbooks routinely discuss the use of adjusted betas.[6]

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[5] For a thorough discussion of the method used for estimating Merrill Lynch betas, see *Security Risk Evaluation Service,* Merrill Lynch, New York, June 1984.

[6] See, for example, Chapter 9 of the best-selling corporate finance textbook by Brealey and Myers (1991) and the well-known investment textbook by Sharpe and Alexander (1990), Chapter 15, Section 8.1, "Adjusting Beta.

Estimation of Beta by Value Line

The return security i is regressed against the return on the New York Stock Exchange Composite Index in the following form:

$$\ln\left(\frac{p^i_t}{p^i_{t-1}}\right) = \alpha_i + \beta_i \ln\left(\frac{p^m_t}{p^m_{t-1}}\right)$$

where:

p^i_t - The price of security i at time t

p^i_{t-i} - The price of security i one week before time t

p^m_t and p^m_{t-1} are the corresponding values of the New York Stock Exchange Index.

The natural log of the price ratio is used as an approximation of the return and no adjustment is made for dividends paid during the week.

The regression estimate of beta, β_i, is computed from data over the past five years, so that 259 observations of weekly price changes are used.

Value Line adjusts its estimate of beta for regression bind described by Blume (1971). The reported beta is the adjusted beta computed as

Adjusted $\beta_i = 0.35 + 0.67\beta$

M. Blume, "On the assessment of risk," Journal of Finance, March 1971

BETA Beta

Mnemonic	BETA
Units	Decimal

The monthly fundamental beta is a measurement of the sensitivity of a company's stock price to the overall fluctuation in the Standard & Poor's 500 (S&P 500) Index Price for U.S Companies, or the Toronto Stock Exchange 300 (TSE 300) Index Price for Canadian Companies. For example, a beta of 1.5 indicates that a company's stock price tends to rise (or fall) 1.5%, with a 1% rise (or fall) in the index price.

Beta is calculated for a 5-year (60-month) time period, ending in the current month. If less history is available, *Beta* will be calculated for as few as 24 months. Monthend closing prices (including dividends) are used in the calculation.

Carolina Water Service, Inc.
Department of Consumer Affairs Witness Legler's CAPM Cost of Equity Capital Corrected to Properly Reflect Historical and Projected Market Equity Risk Premiums, Value Line Adjusted Betas and the Empirical Capital Asset Pricing Model

	Value Line Adjusted Beta (1)	Company-Specific Risk Premium Based on Market Premium o 9.5% (2)	CAPM Result Including Risk-Free Rate of 5.7% (3)
Traditional Capital Asset Pricing Model (4)			
Value Line's Water Companies	0.61	5.8 %	11.5 %
Empirical Capital Asset Pricing Model (5)			
Value Line's Water Companies	0.61	6.7 %	12.4 %
Conclusion			
Value Line's Water Companies			12.0 %

Notes: (1) From Exhibit ___(JBL-1), Schedule 9.
(2) From Exhibit No. ___(PMA-1), Schedule 13, page 4, Note 1.
(3) From page 31 of Mr. Legler's direct testimony.
(4) As described in Note 3, page 4 of Schedule 13, Exhibit No. ___(PMA-1).
(5) As described in Note 4, page 4 of Schedule 13, Exhibit No. ___(PMA-1).